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Space Administration

Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

Mars Trek: An Interactive Web Portal for Current and Future Missions to Mars

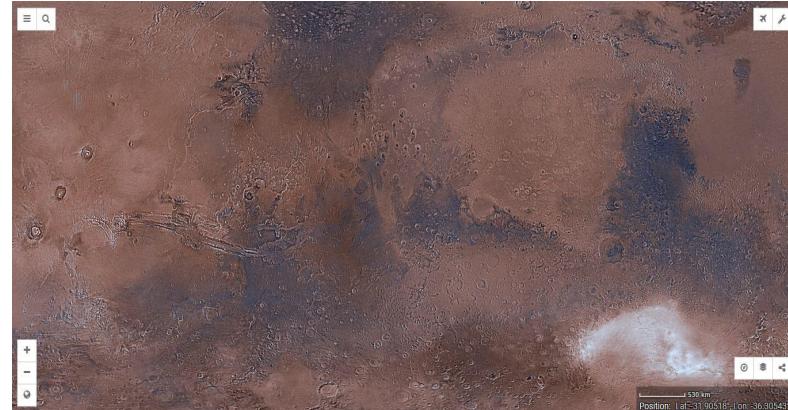
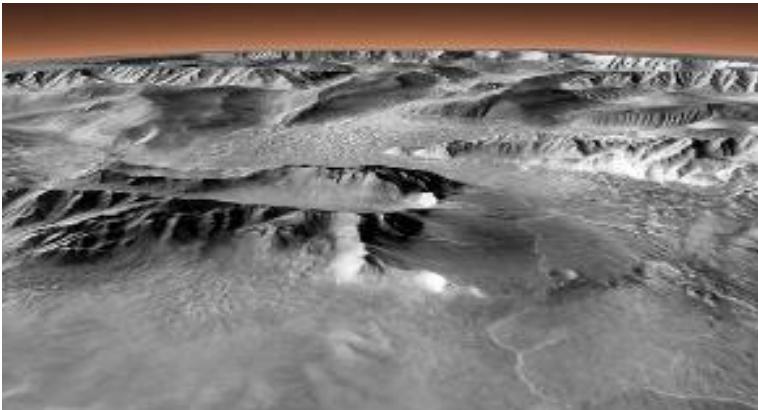
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JPL Development Team:

Eddie Arevalo, Bach Bui, George Chang, Natalie Gallegos

Richard Kim, Shan Malhotra, Syed Sadaqathullah, Catherine Suh, Dan Yu, Quoc Vu



These activities were carried out at the Jet Propulsion Laboratory, California Institute of Technology,
under a contract with the National Aeronautics and Space Administration.

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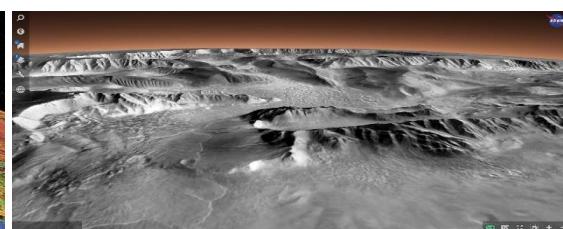
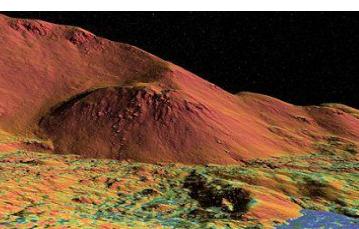
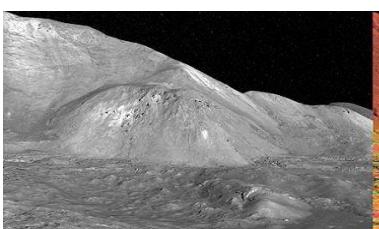
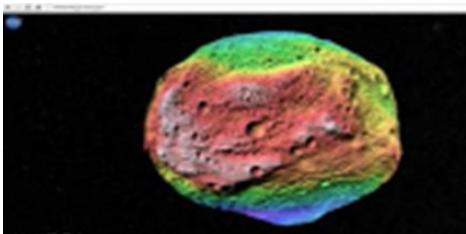
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Overview

Planetary Mapping and Modeling - Solar System TREKS

- With development and operations at JPL, this is an integral project within NASA's Solar System Exploration Research Virtual Institute (SSERVI).
- A set of data products, interactive tools and technology for exploration
 - Mission Planning
 - Scientific Research
 - Public Outreach
- Online, browser-based Web portal; nothing to install
- Visualization, Analysis, 3D Printing, Data Service
 - A variety of user interfaces (e.g., virtual reality goggles)
 - A variety of external platforms (e.g., Eyes on Solar System, planetariums)
 - Applicable to a wide range of target bodies, with portals for the Moon, Mars, Vesta, and more to come





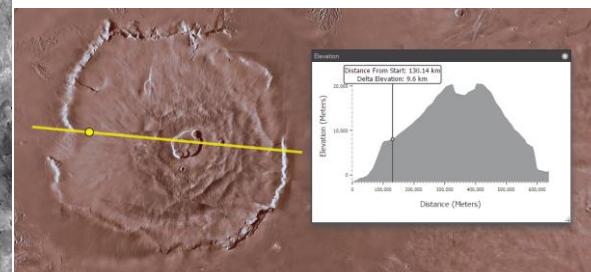
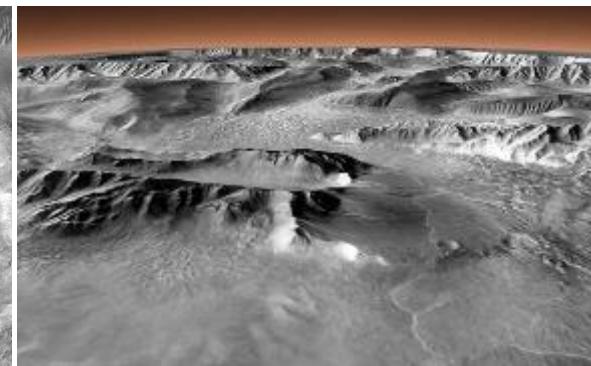
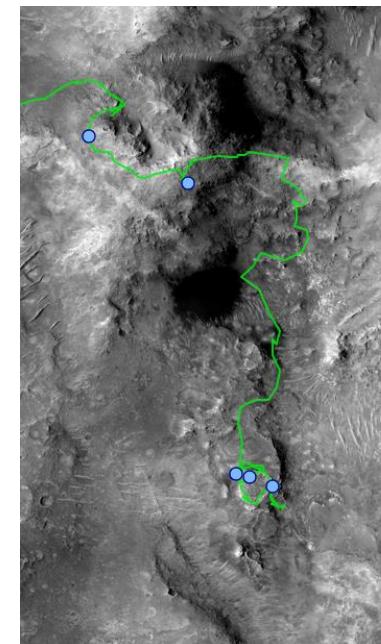
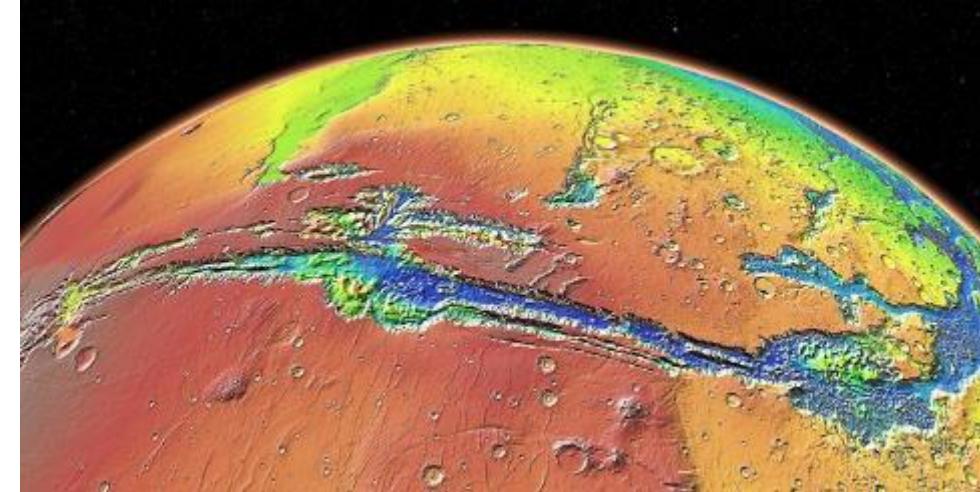
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- Analysis tools
 - Distance, Profile, Sun Angle, Spacecraft Overhead
- Landing Site features
 - Viking, MER, MSL, Phoenix, Pathfinder
- Visualization (with overlays)
- 3D fly over and printing
- Data
 - Mars Reconnaissance Orbiter, Mars Odyssey, Mars Global Surveyor, Viking, Mars Express
- Users
 - EPO, Scientists



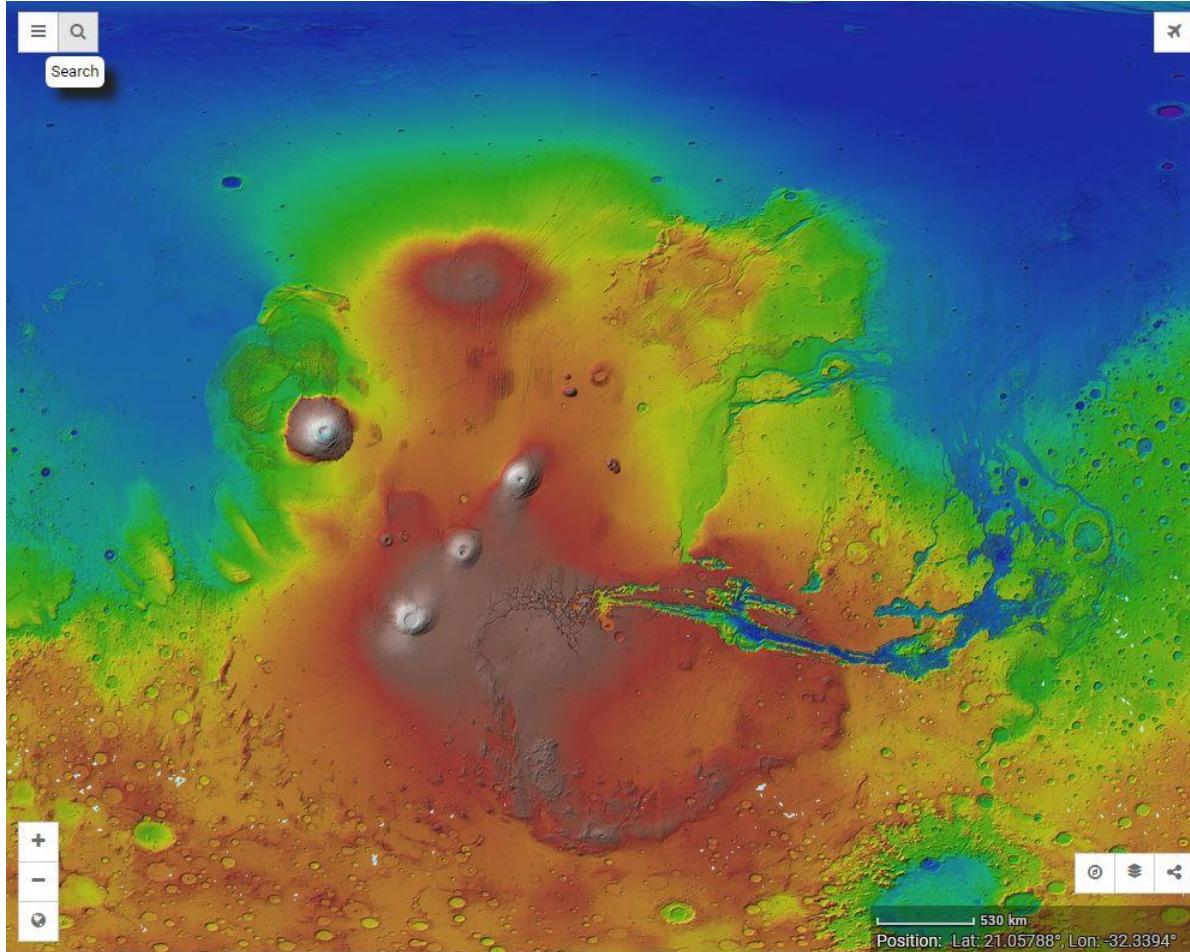


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Tools

Create Bookmark

Generate 3D Print File

Calculate Distance

Calculate Elevation Profile

Calculate Sun Angle

Detect Craters

Detect Rocks

Subsetting

Slope



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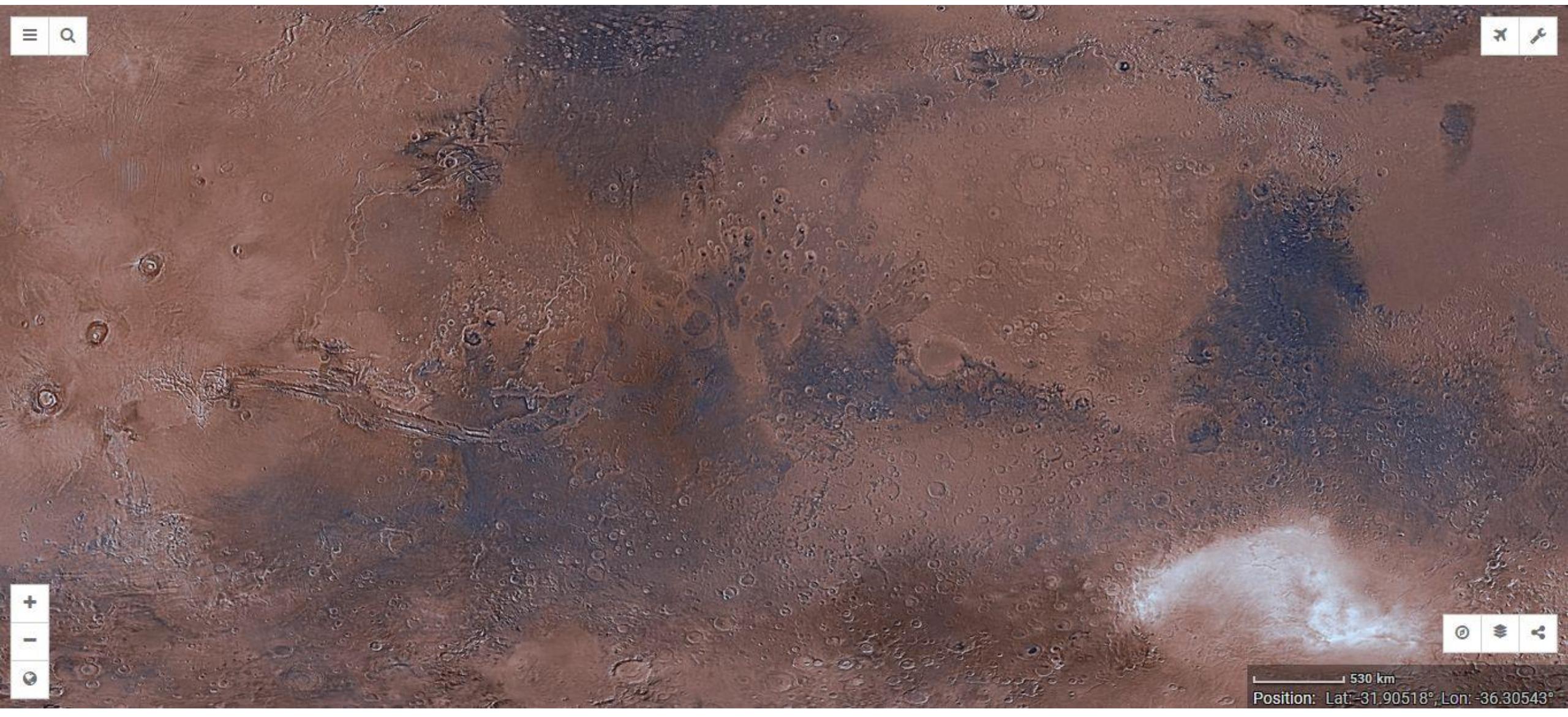
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530 km
Position: Lat: -31.90518°, Lon: -36.30543°

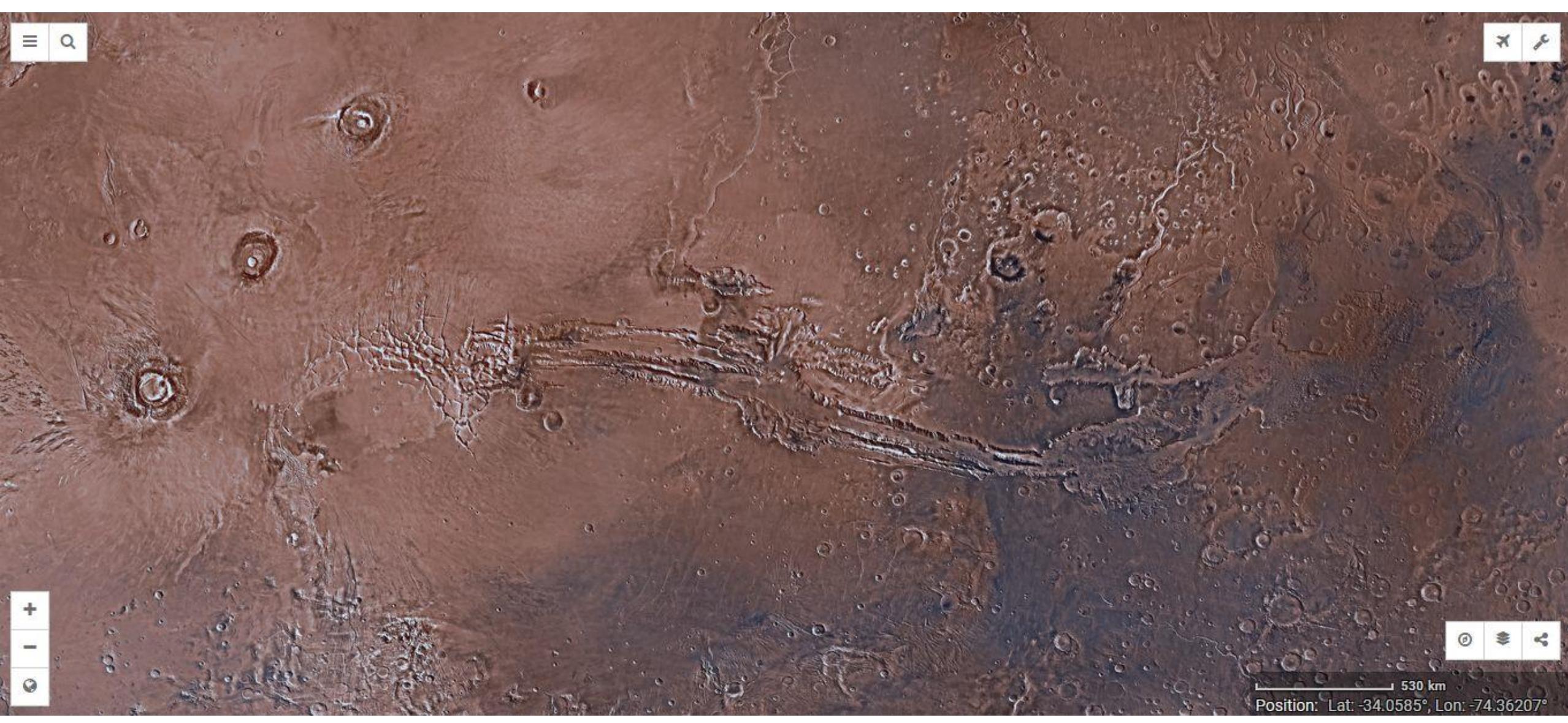


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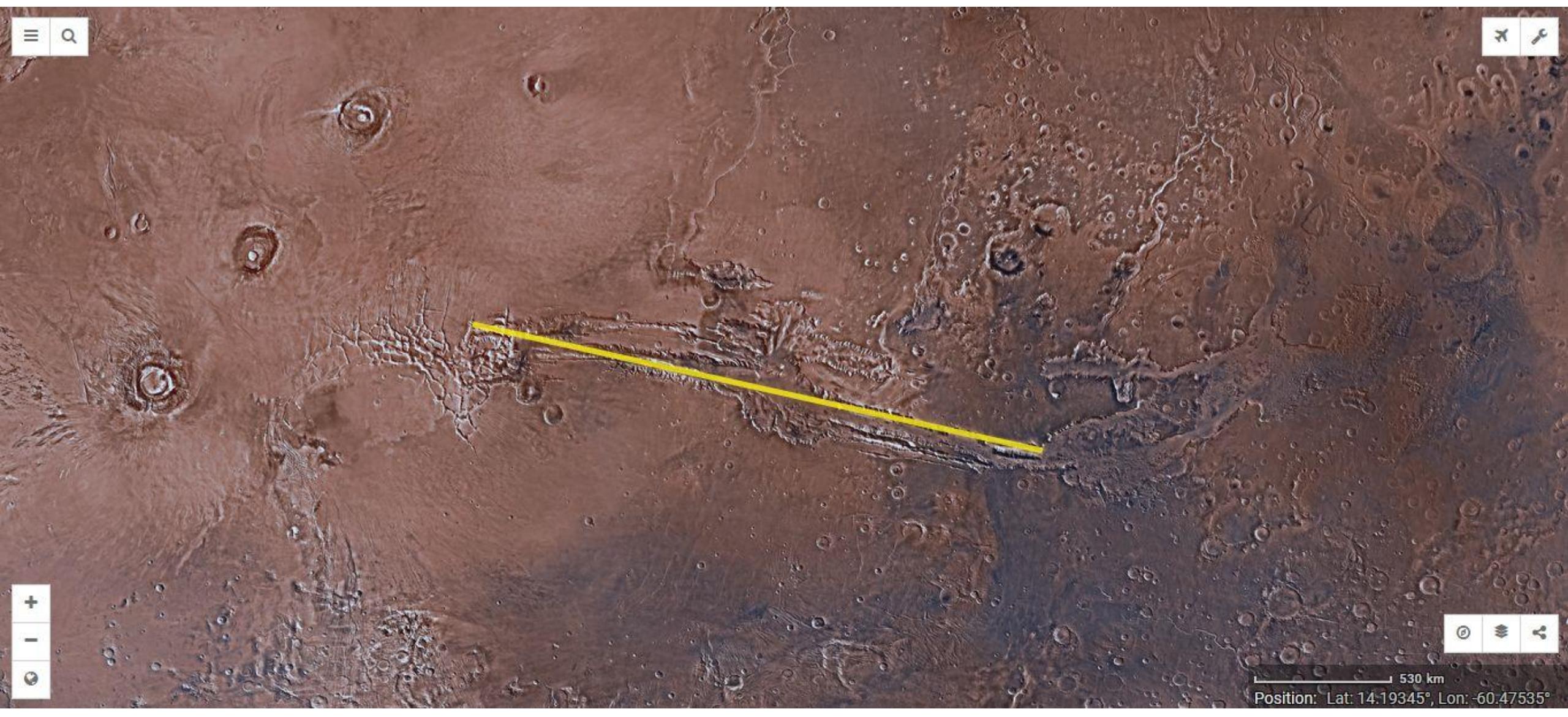


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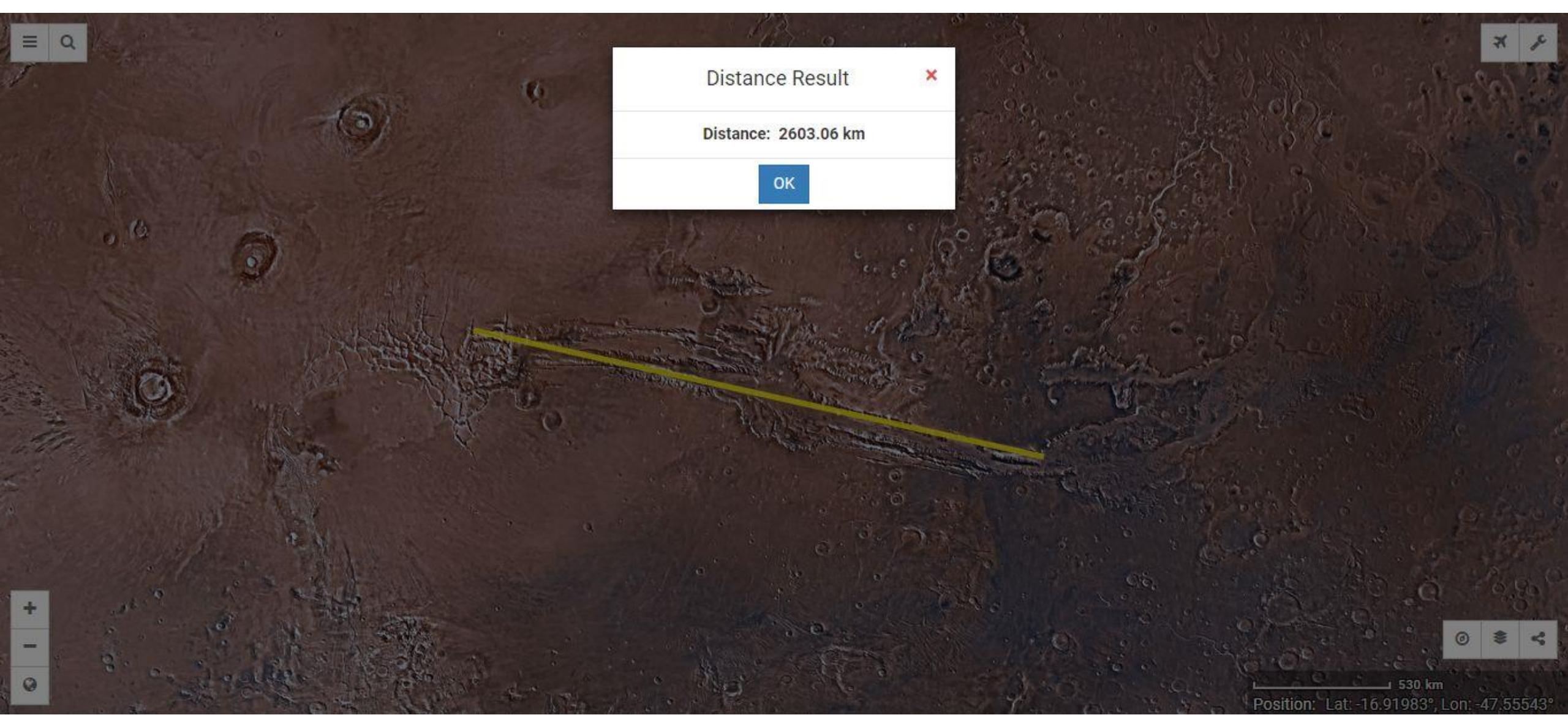


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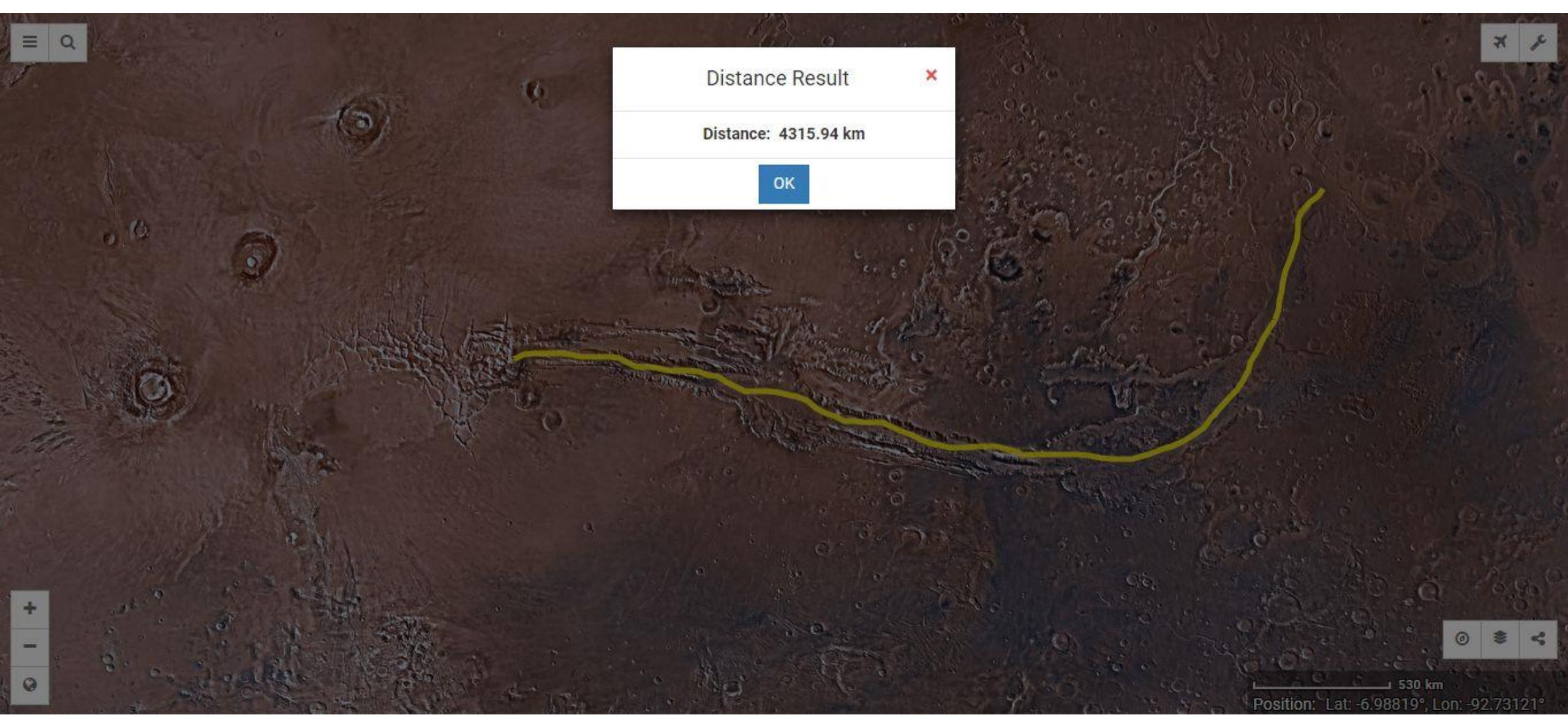


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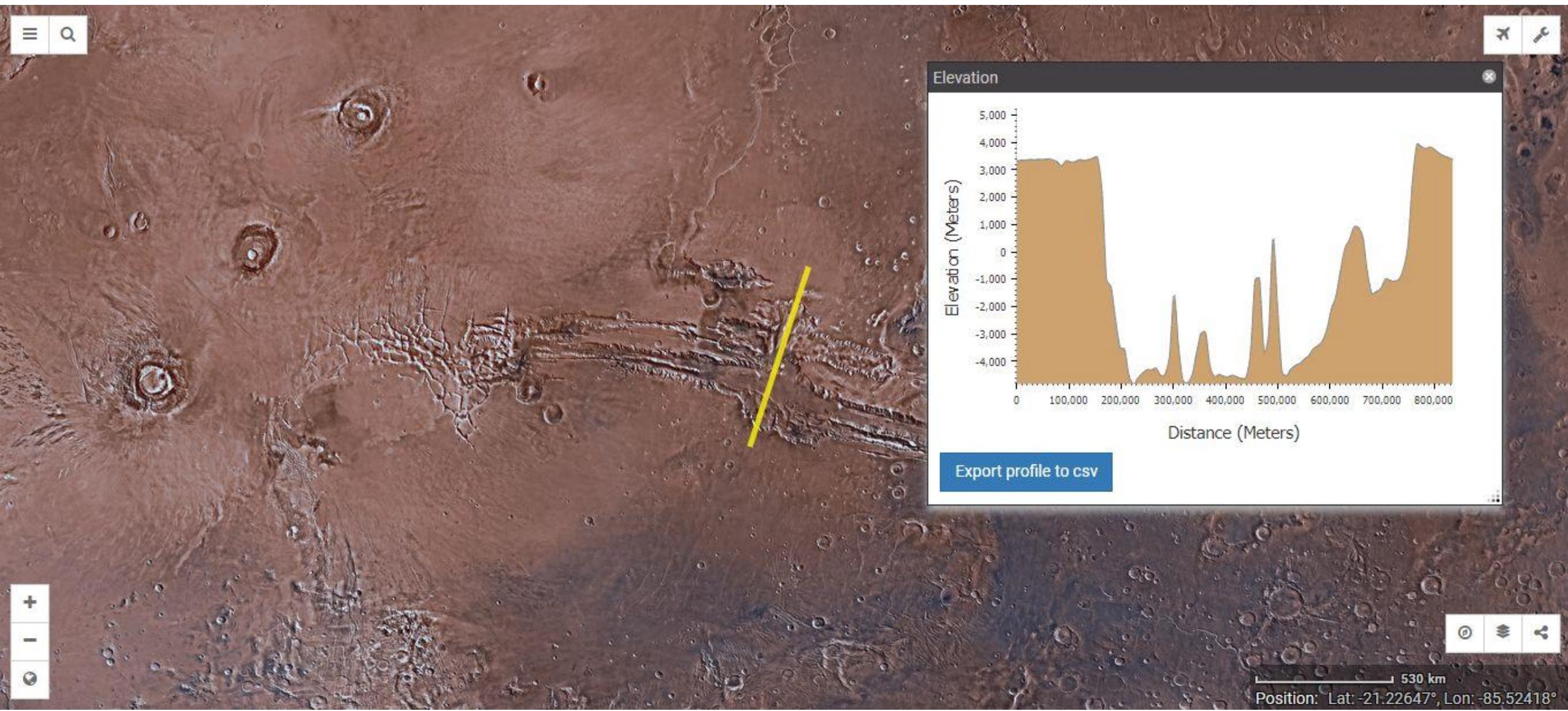


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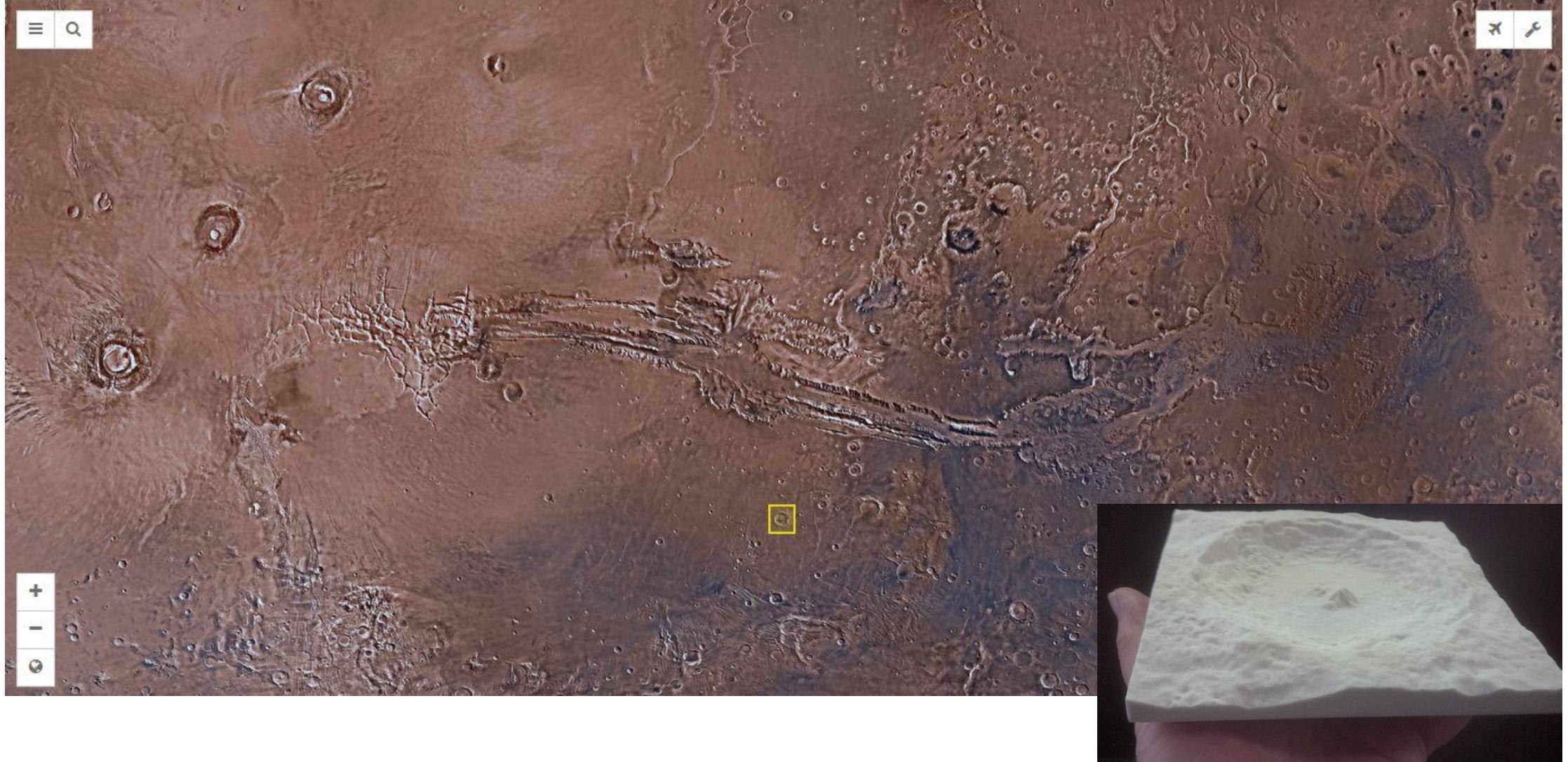


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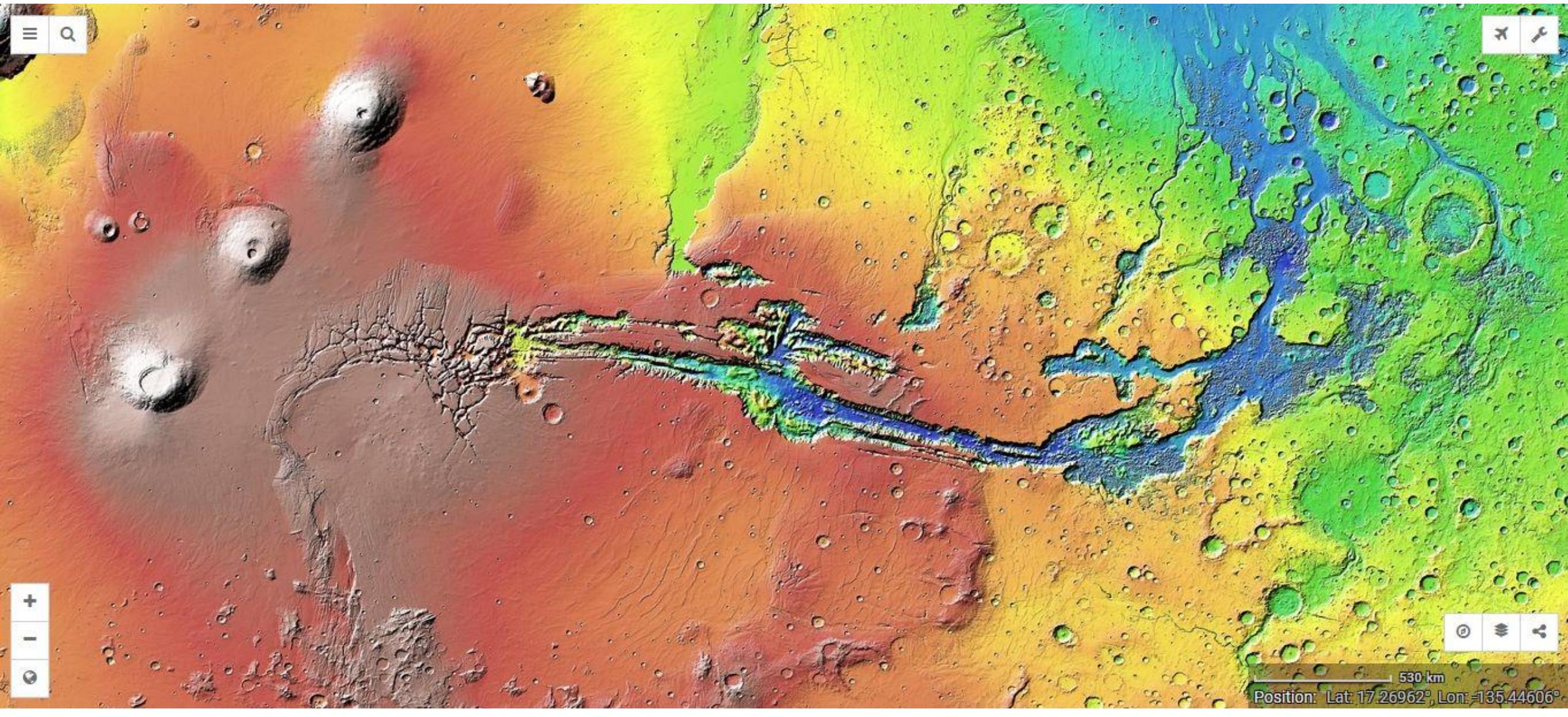


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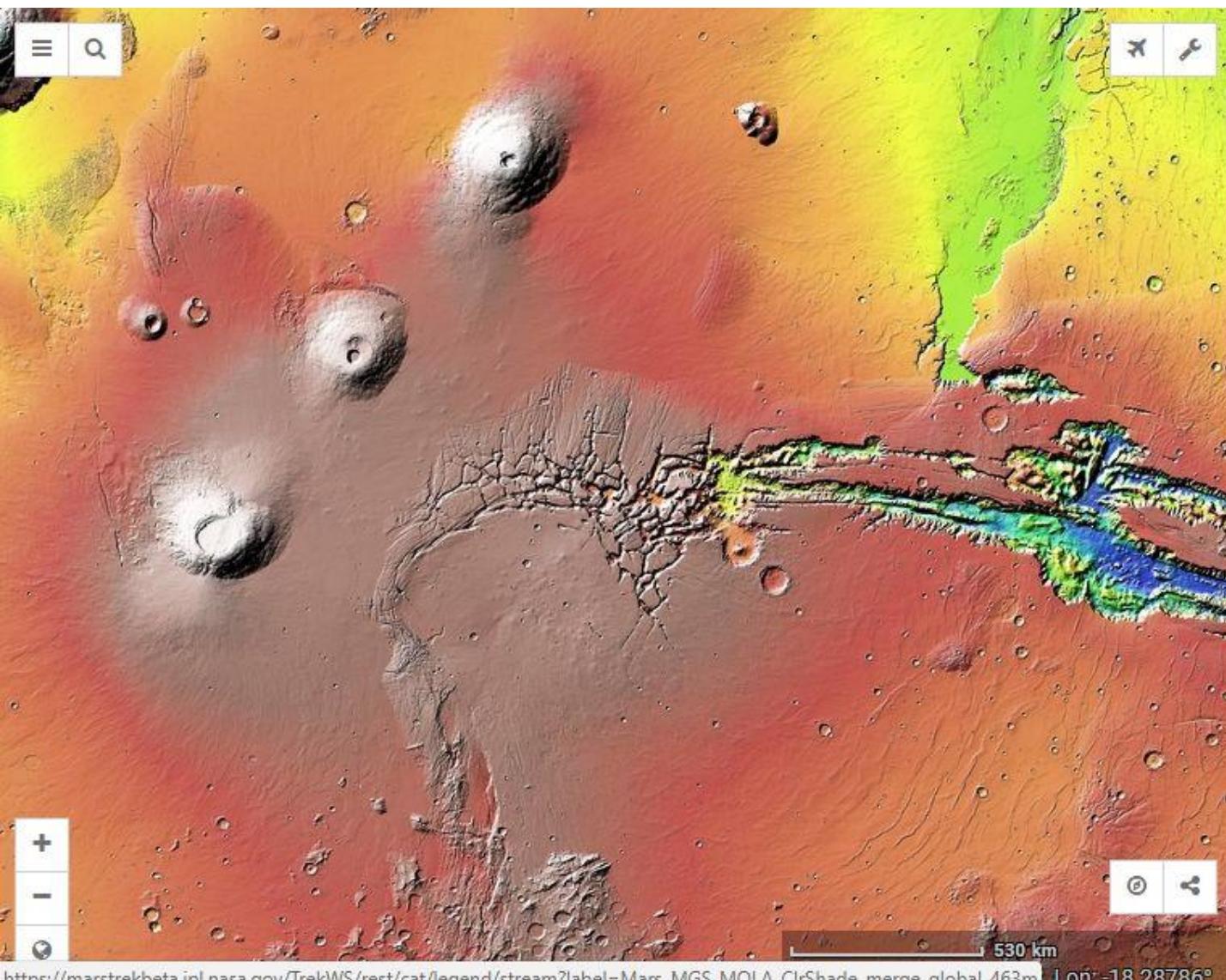


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Layers

Added Static

MGS MOLA, Global Color Hillshade

0% 50% 100%

Elevations above 9000 meters found only on the larger volcanos

-8200 Minimum 21229 Maximum

+ Add Layer

530 km

530 km

0% 50% 100%

-8200 Minimum 21229 Maximum

Elevations above 9000 meters found only on the larger volcanos

+ Add Layer

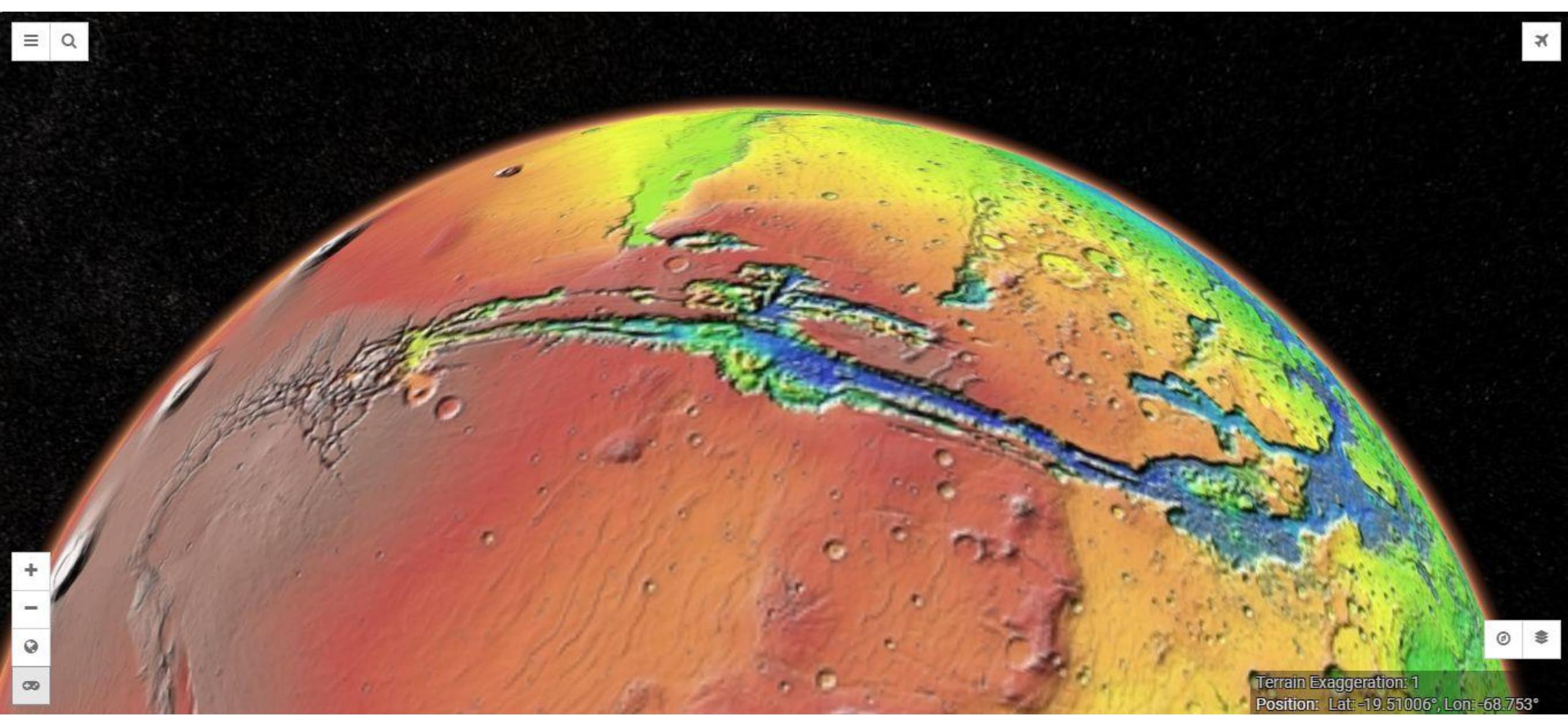


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Terrain Exaggeration: 1
Position: Lat: -19.51006°, Lon: -68.753°

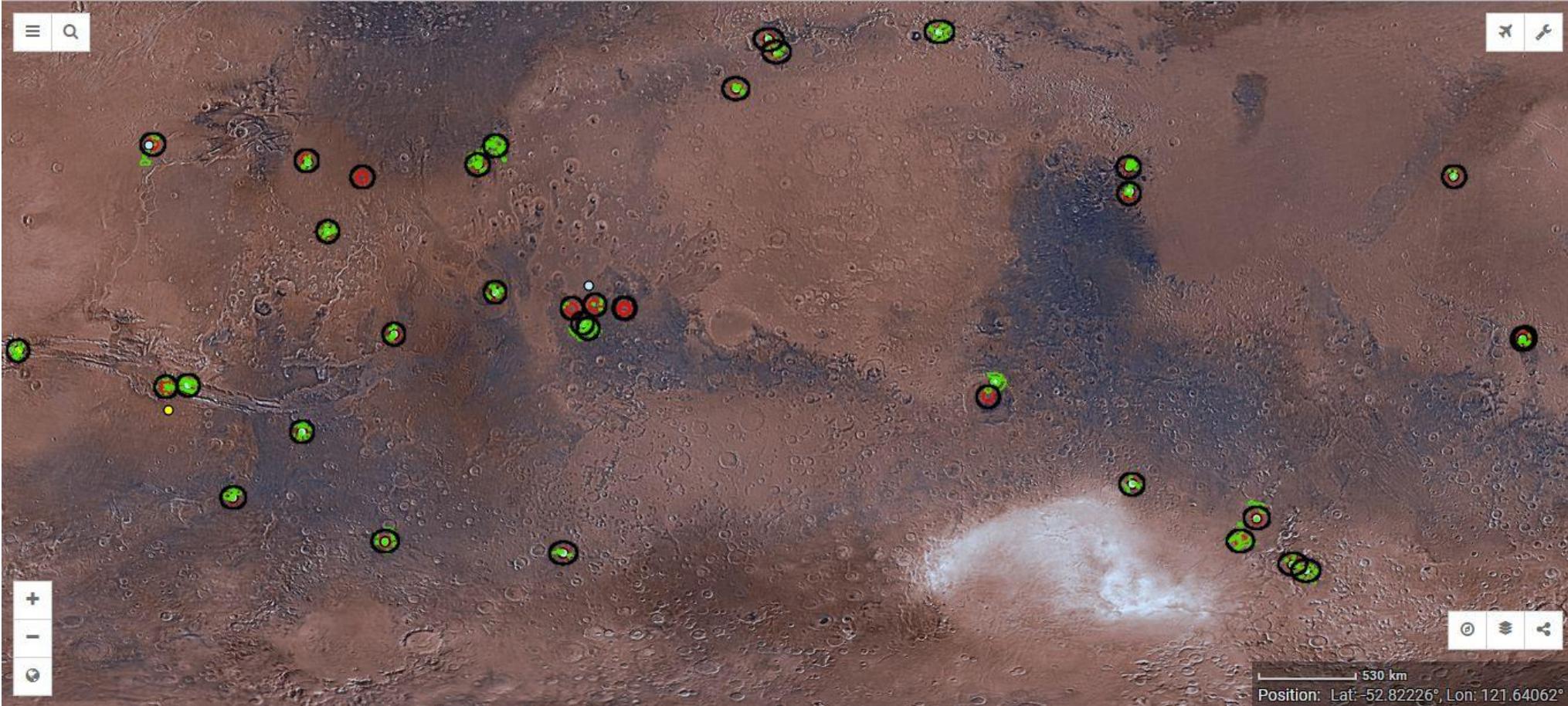


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Mars Exploration Zones



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Mars Exploration Zones

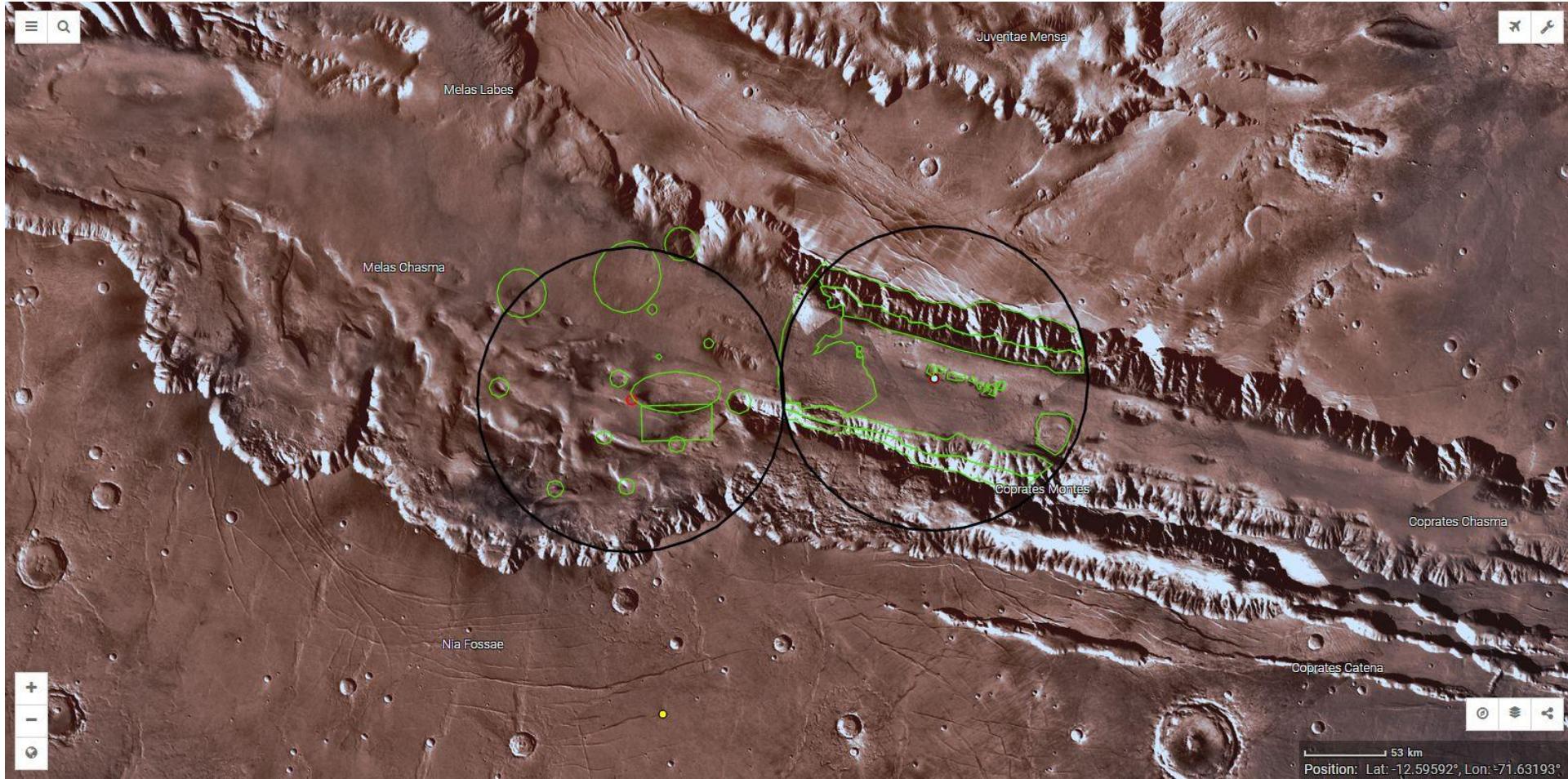


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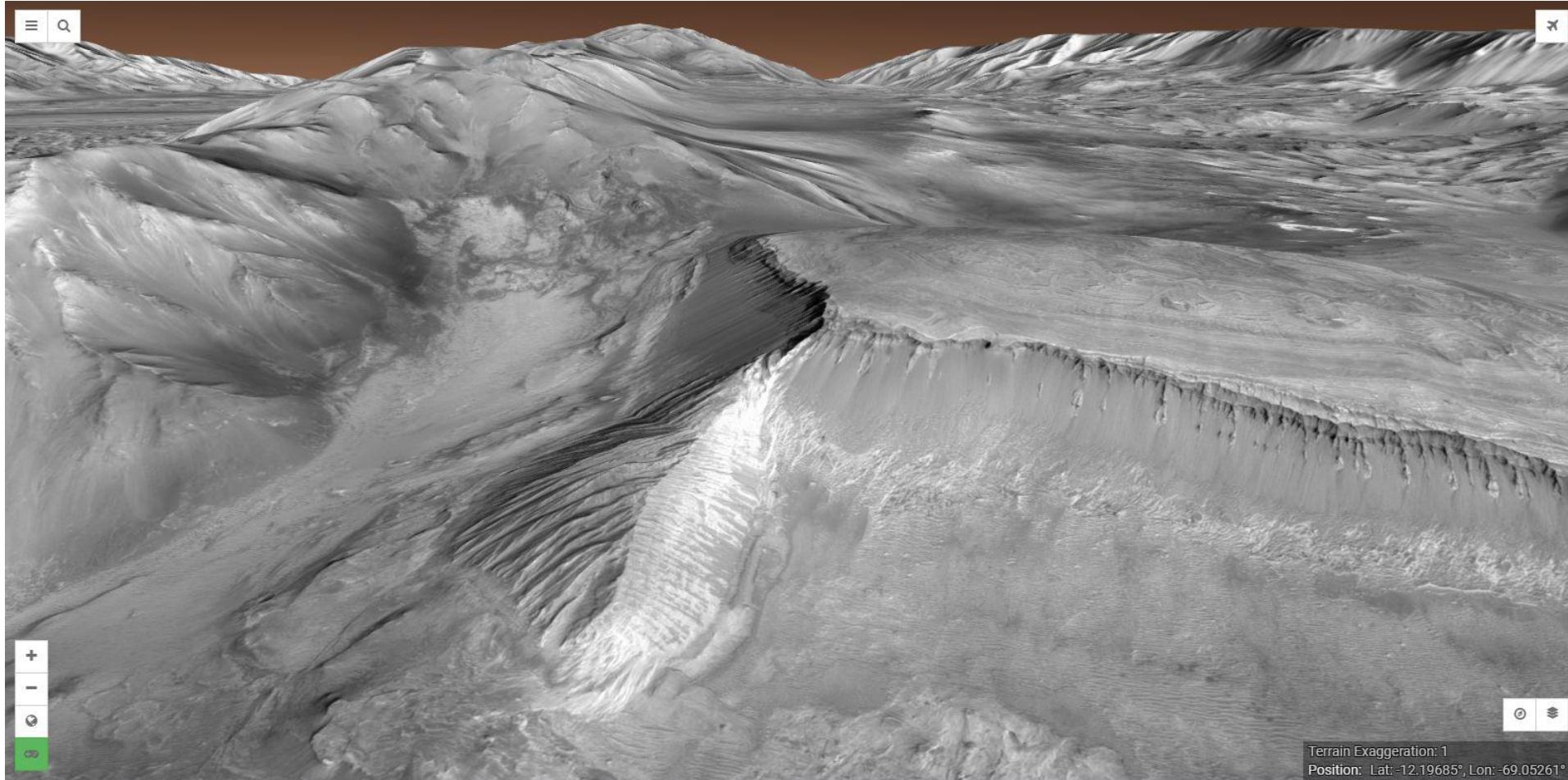


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Valles Marineris – Eastern Melas Chasma
CTX Mosaic

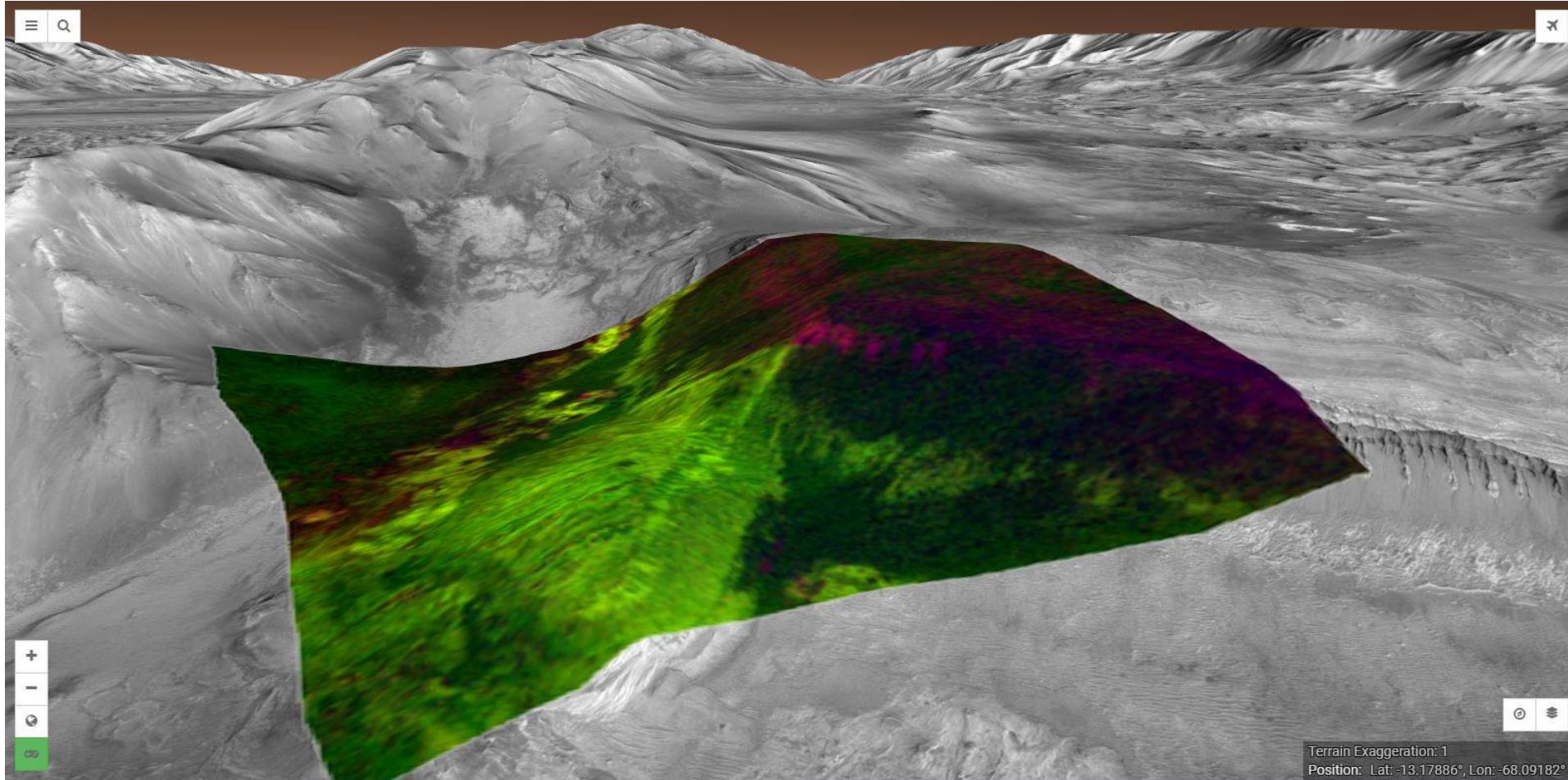


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Valles Marineris – Eastern Melas Chasma
CTX Mosaic with overlay of CRISM Bound Water Polyhydrated Sulfates

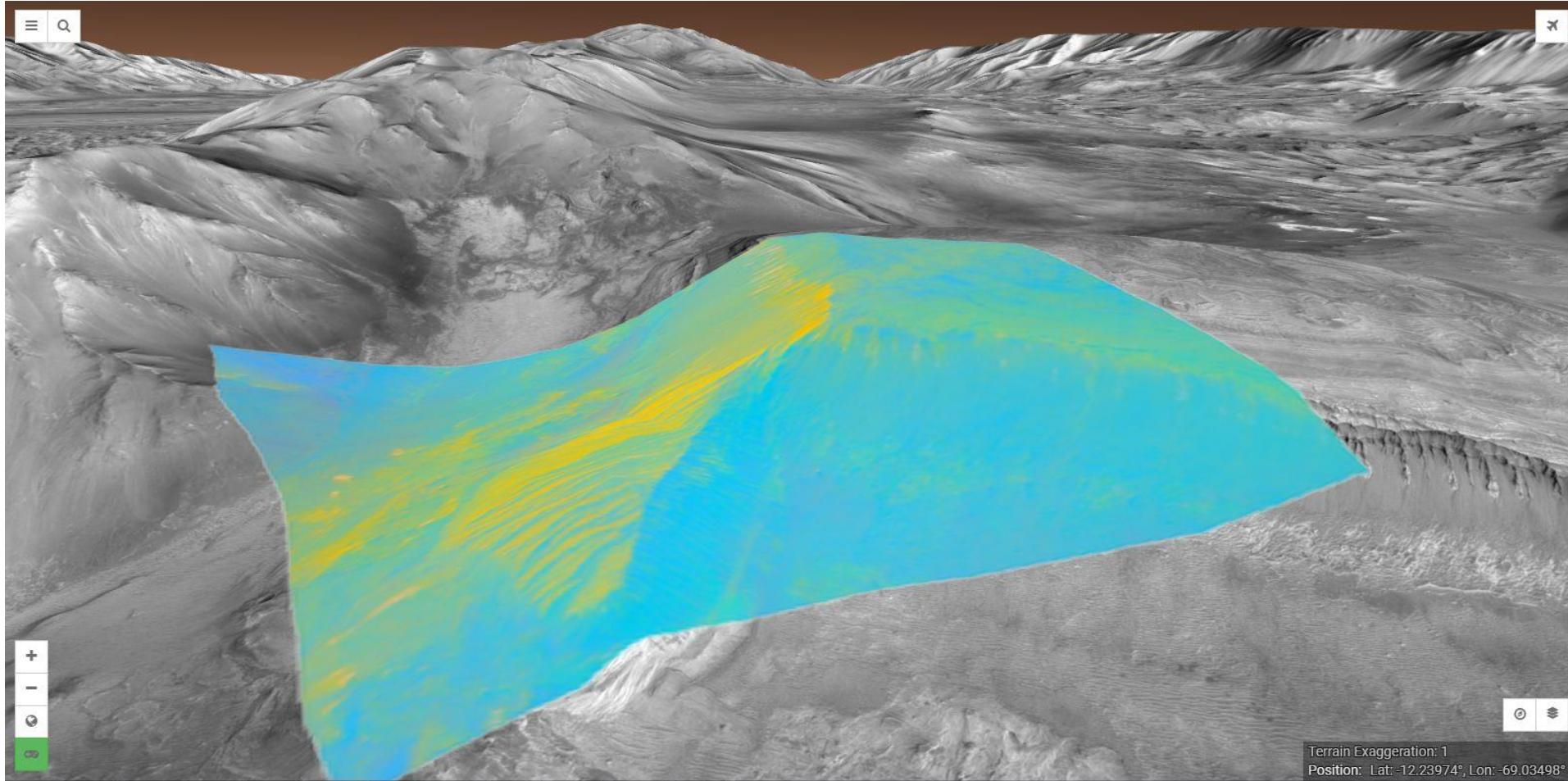


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Valles Marineris – Eastern Melas Chasma
CTX Mosaic with overlay of CRISM Chloride Deposits

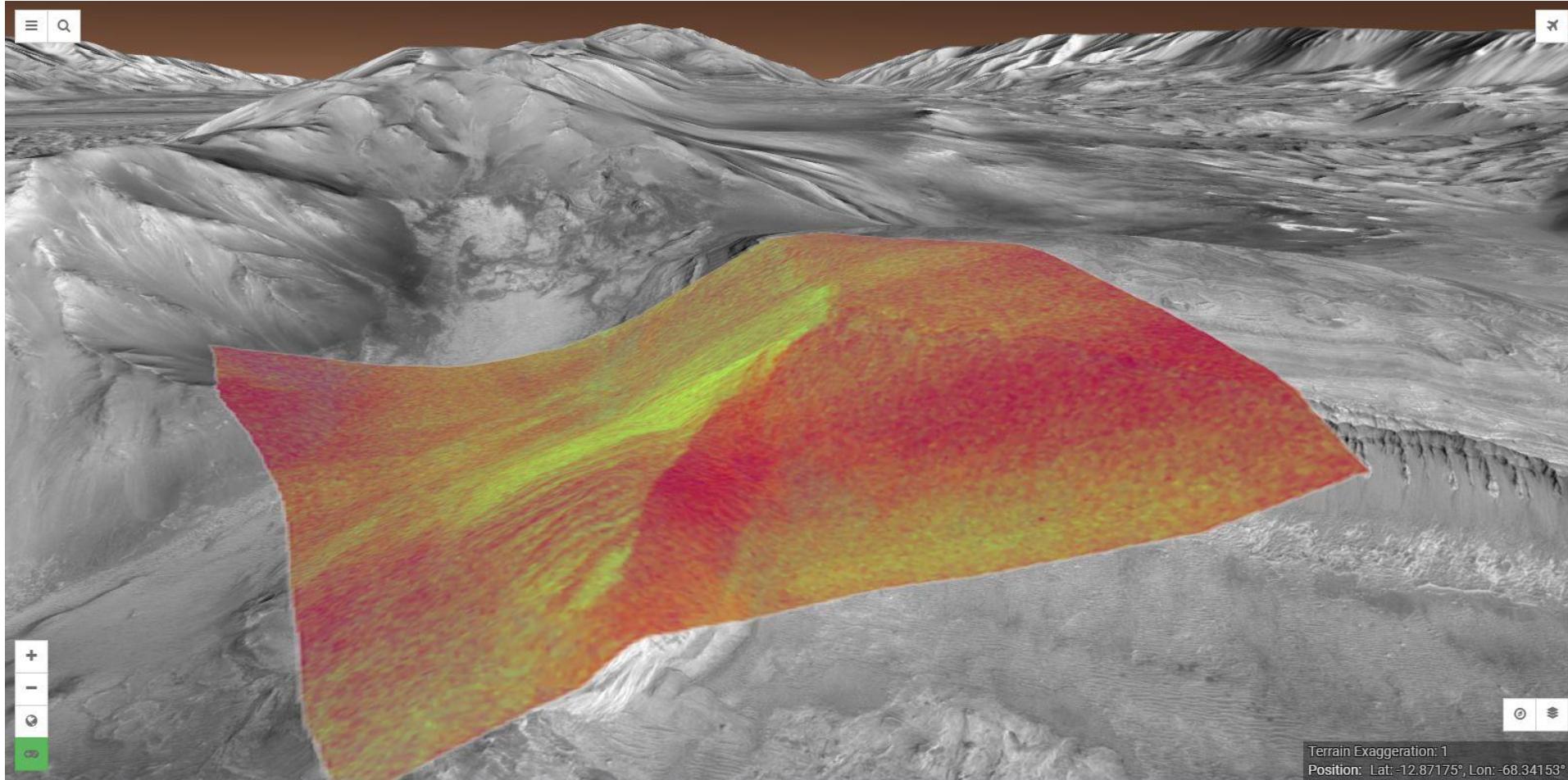


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Valles Marineris – Eastern Melas Chasma
CTX Mosaic with overlay of CTX Iron Minerals

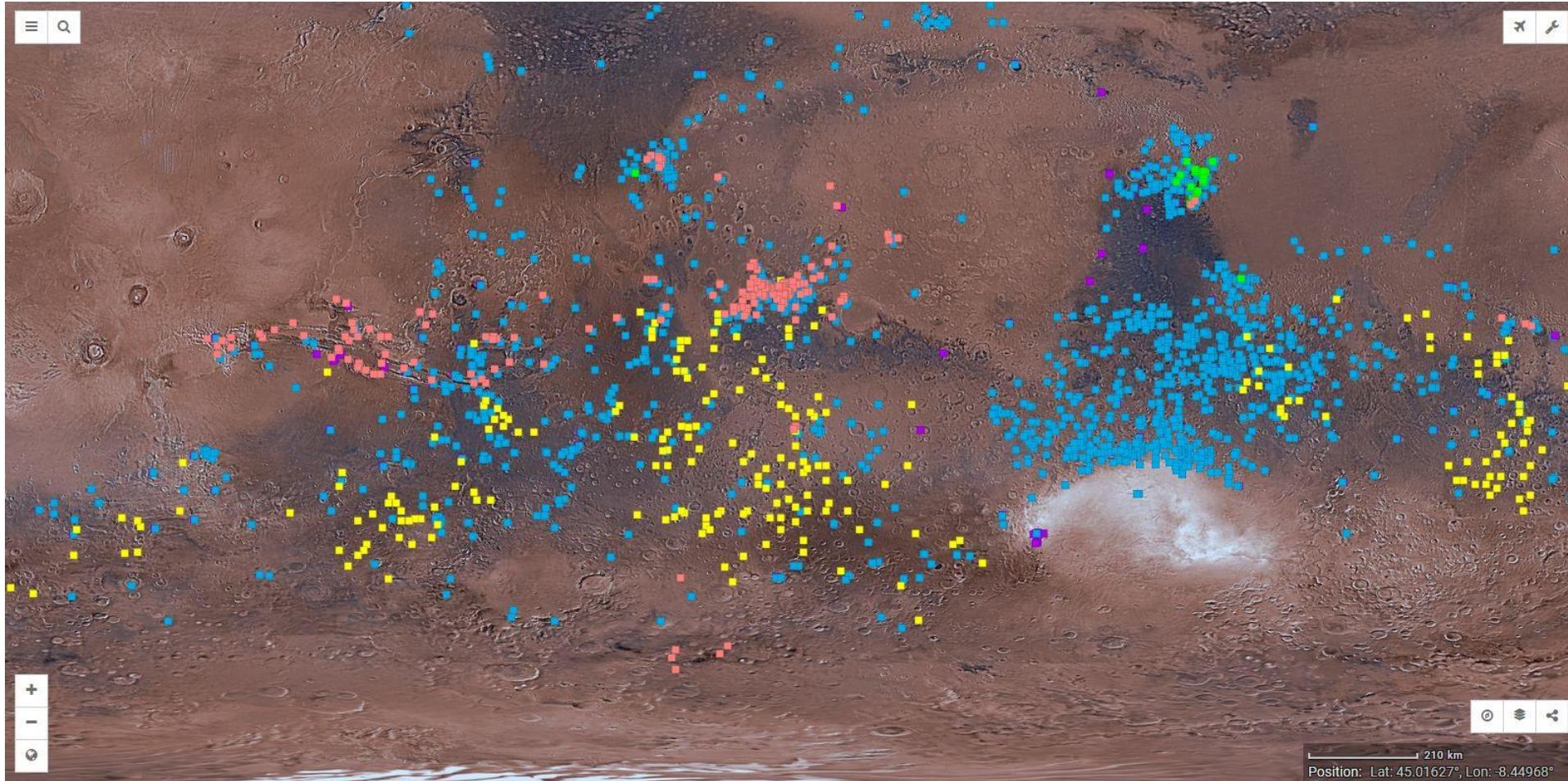


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Hydrous Mineral Detections

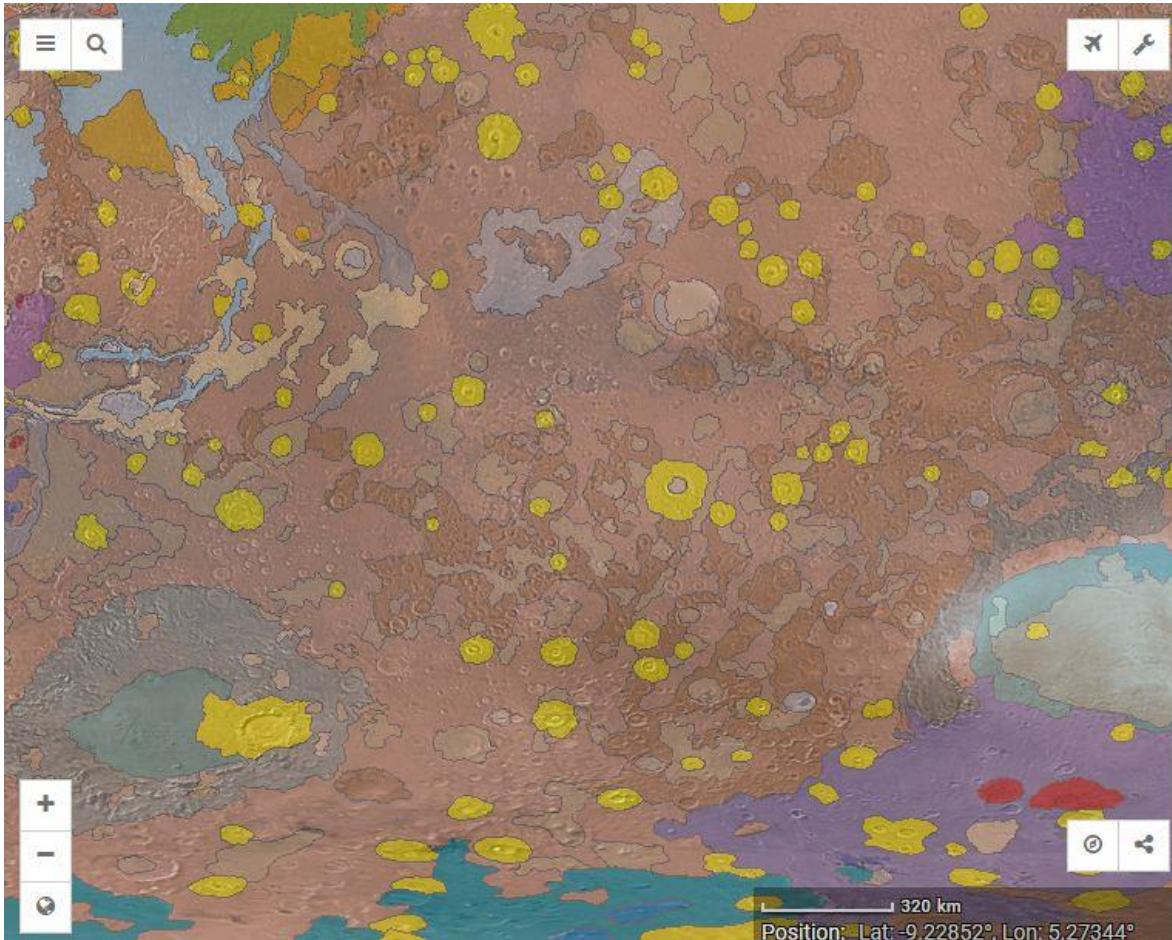


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- Amazonian and Hesperian impact unit
- Amazonian and Hesperian transition undivided unit
- Amazonian and Hesperian volcanic
- Amazonian and Noachian apron unit
- Amazonian apron unit
- Amazonian polar undivided unit
- Amazonian polar unit
- Amazonian volcanic edifice
- Amazonian volcanic unit
- Early Amazonian basin unit
- Early Hesperian basin unit
- Early Hesperian highland unit
- Early Hesperian transition unit
- Early Hesperian volcanic unit
- Early Noachian highland massif unit
- Early Noachian highland unit
- Hesperian and Noachian basin unit
- Hesperian and Noachian highland undivided unit
- Hesperian and Noachian transition unit

Global Geologic Map



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Some Additional Layers

Hydrous Mineral Detections, Chloride Survey, Aqueous Mineral Distribution

CRISM: Carbonate Minerals Fe-Mg, Carbonate Minerals Mg, Infrared False Color, Olivine and Pyroxene Minerals, Hydrated Silica and Al-OH Minerals, Carbon Dioxide Frost or Ice, Mafic Minerals, Hydroxylated Minerals Including Al-Phyllosilicates and Hydrated Silica, Hydroxylated Minerals Including Fe-Mg-Phyllosilicates, Hydroxylated Minerals Including Fe-Mg-OH Phyllosilicates

TES: Albedo Mosaic, Thermal Inertia, High-CA Pyroxene, Plagioclase, Sheet Silicates/High-Si Glass, Surface Dust, TES Dust Cover Index



MOLA Vertical Roughness

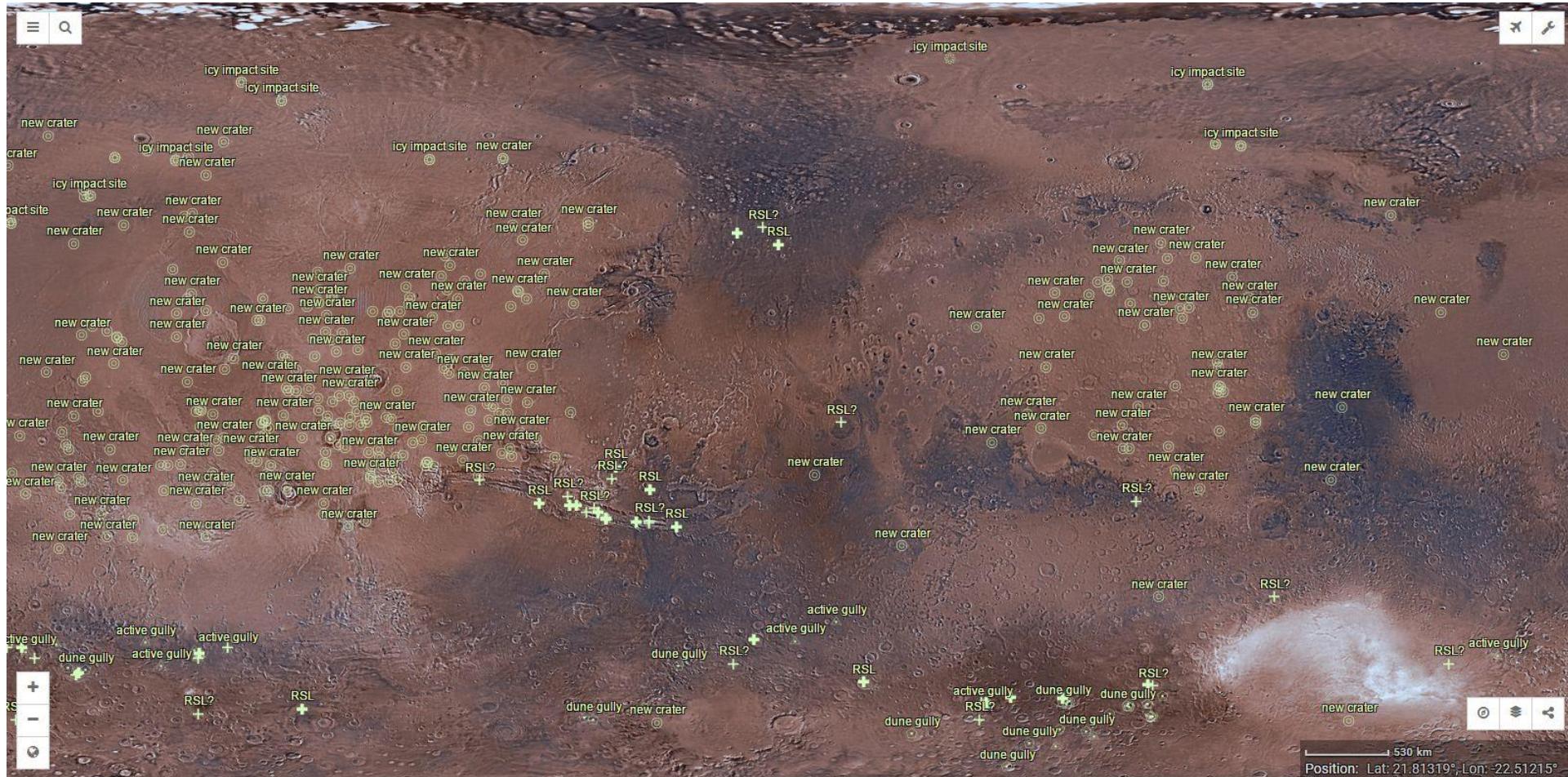


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RSLs, New Craters, and Active Gullies

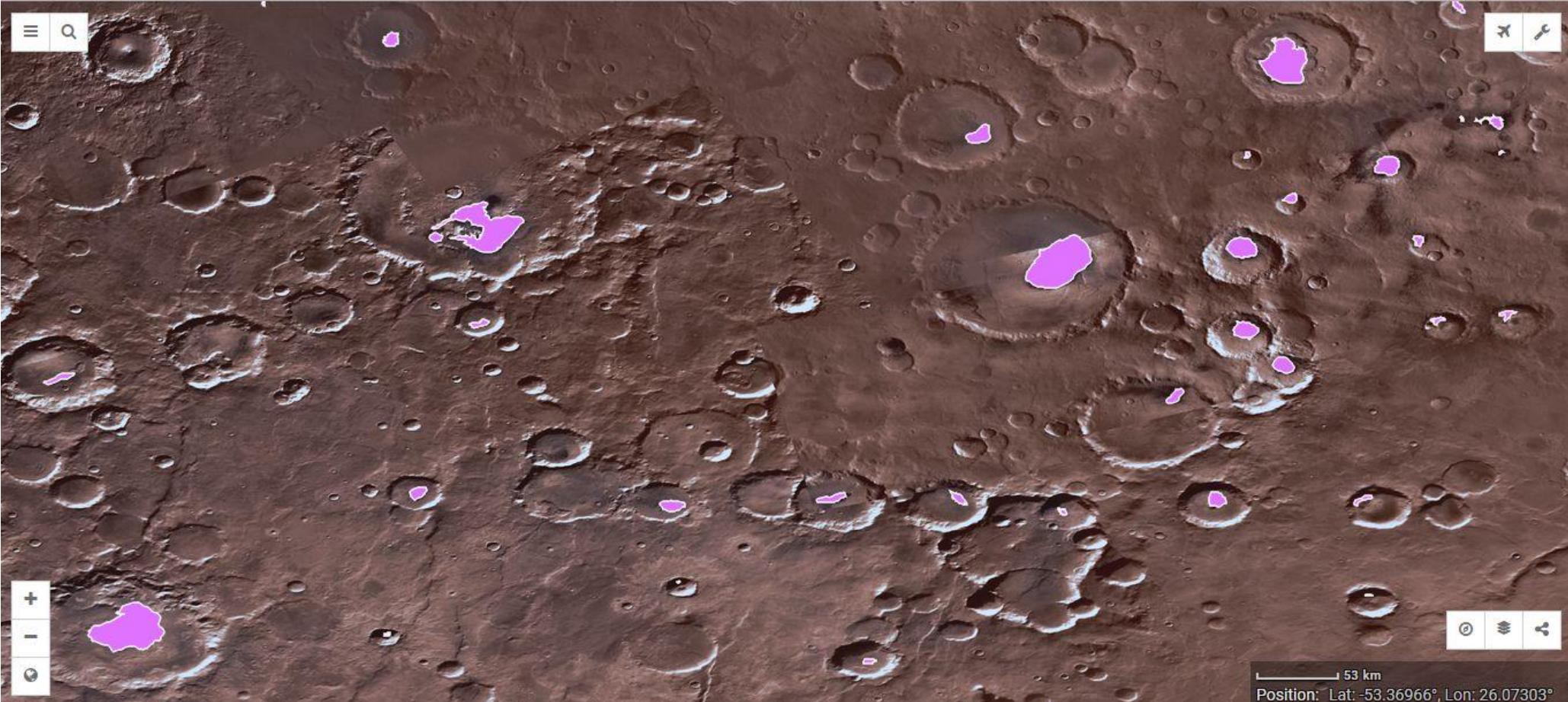


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Mars Dune Fields (Hayward et al, 2007))

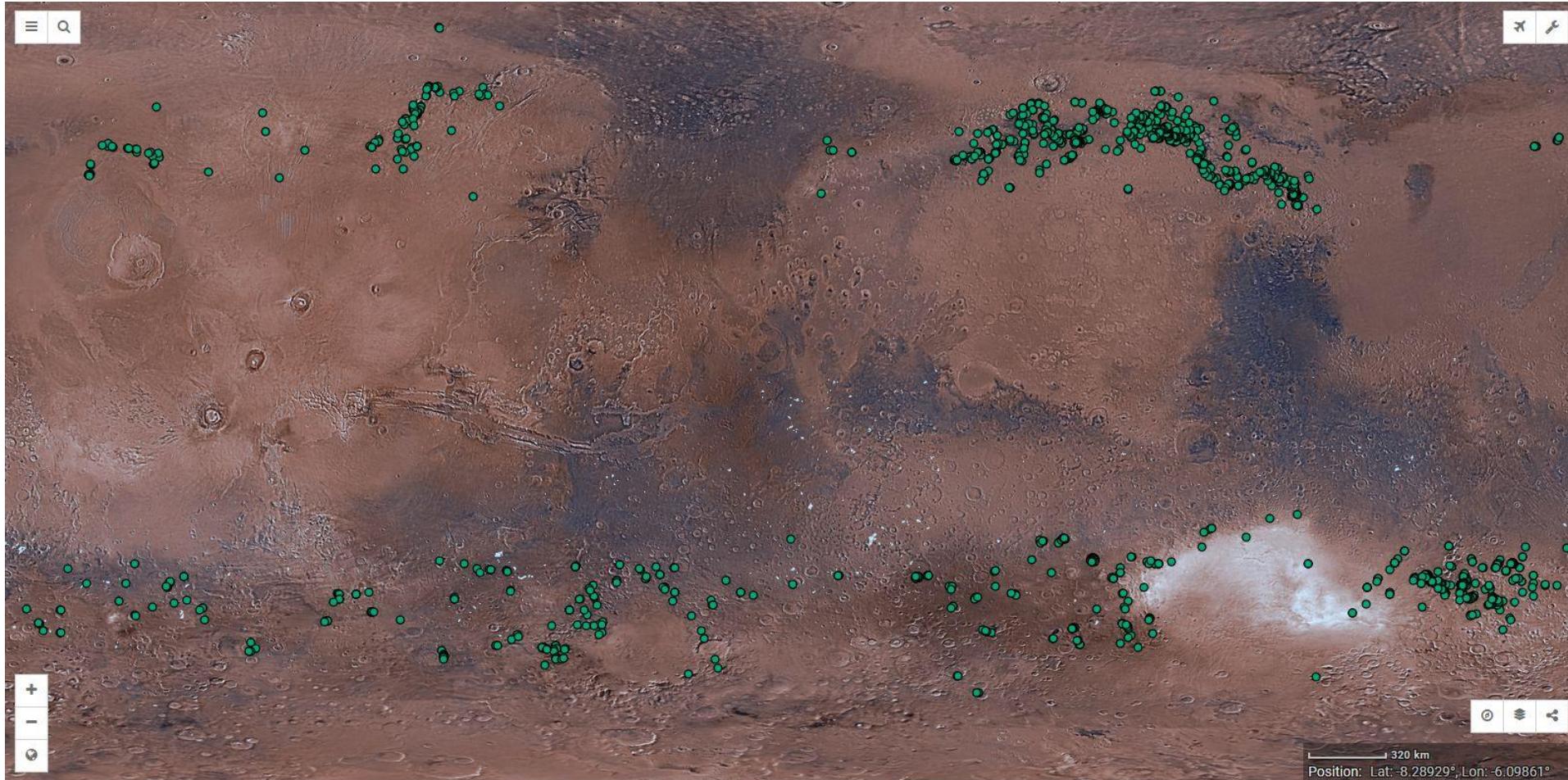


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Glacial landforms showing belts of mid-latitude glaciers

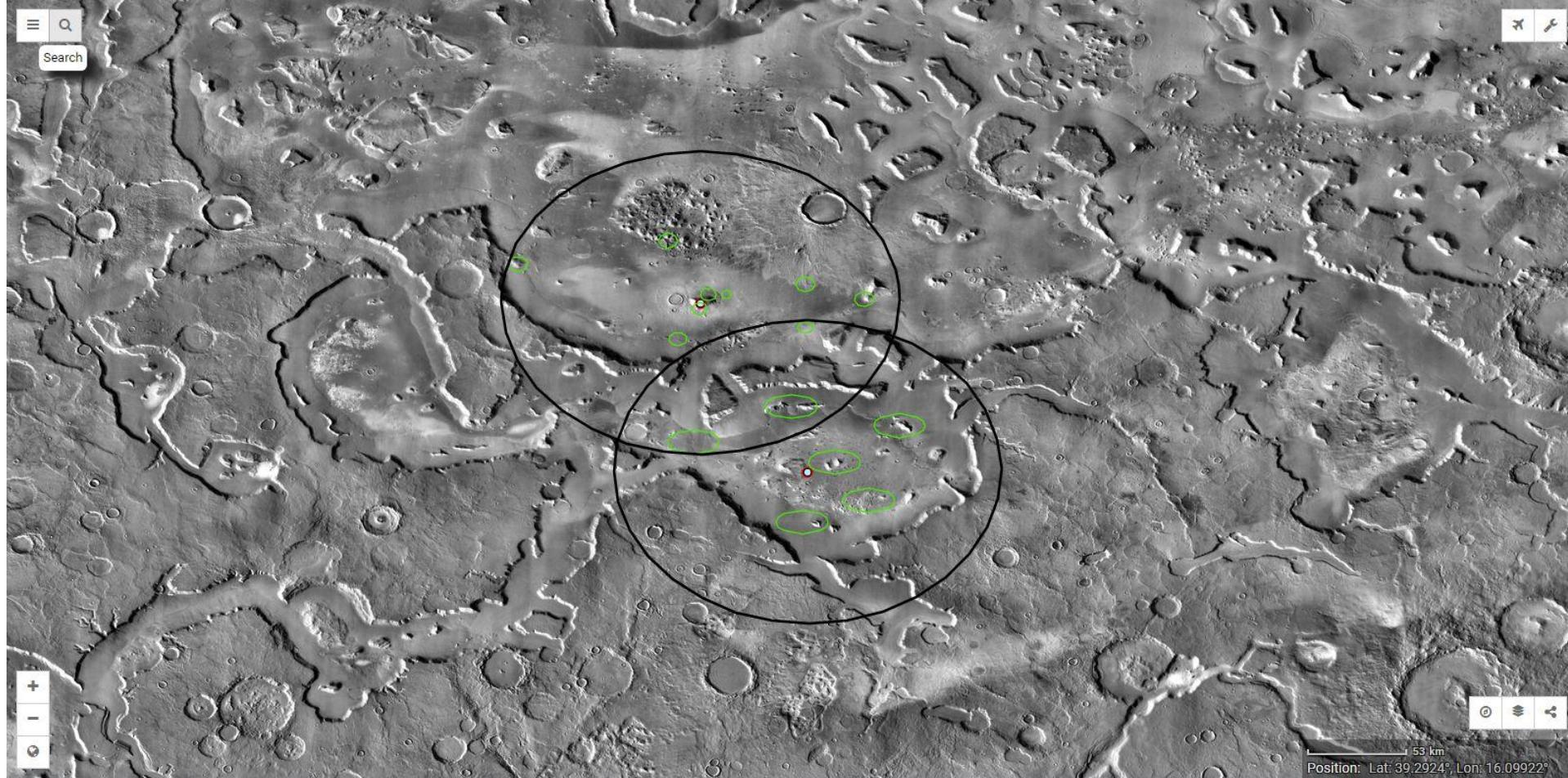


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Exploration Zones in the Deuteronilus Mensae region

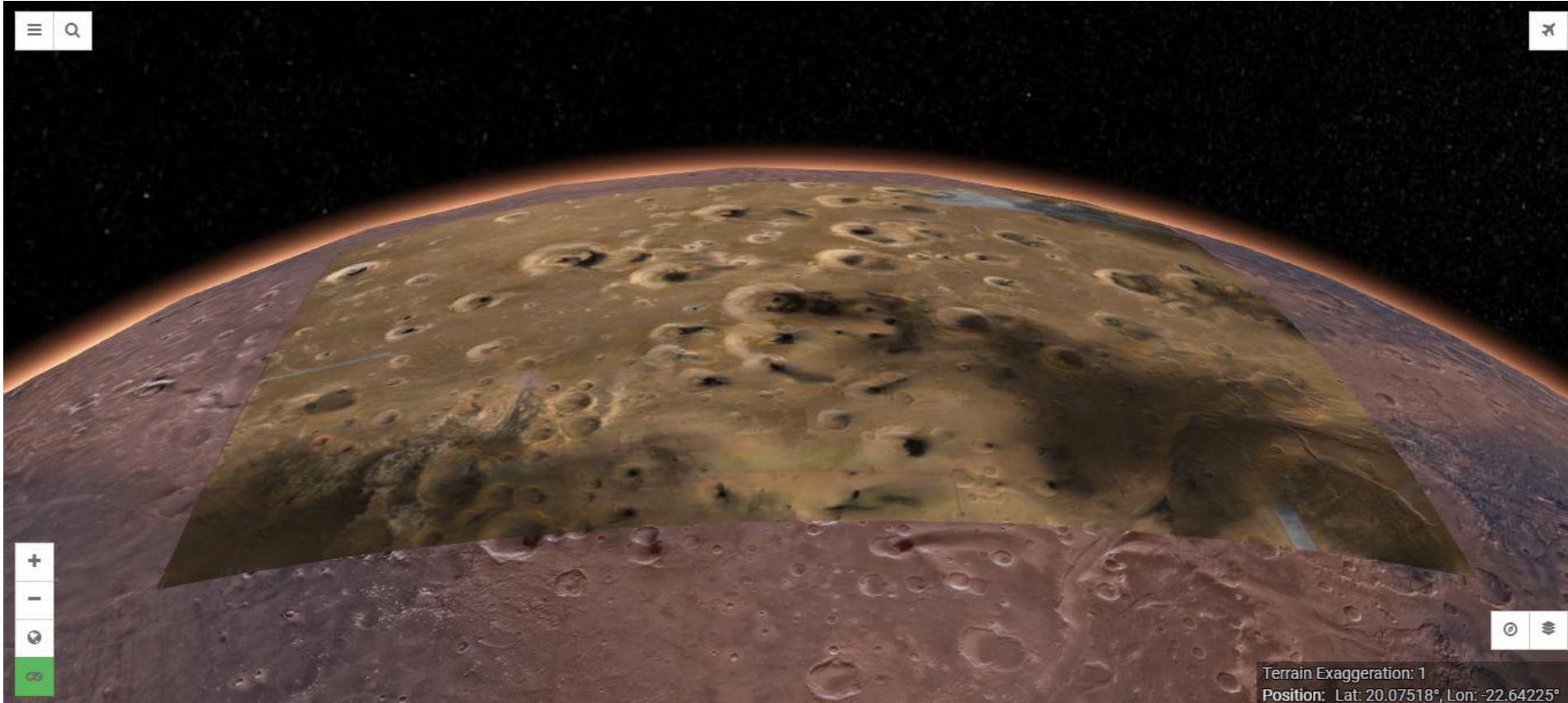


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Mars Express HRSC Mosaics

Working with the HRSC team and SSERVI German PI, Ralf Jaumann, as they produce global mosaics and DEMS. MC-11 quad was the first to be produced, and has been integrated into Mars Trek.



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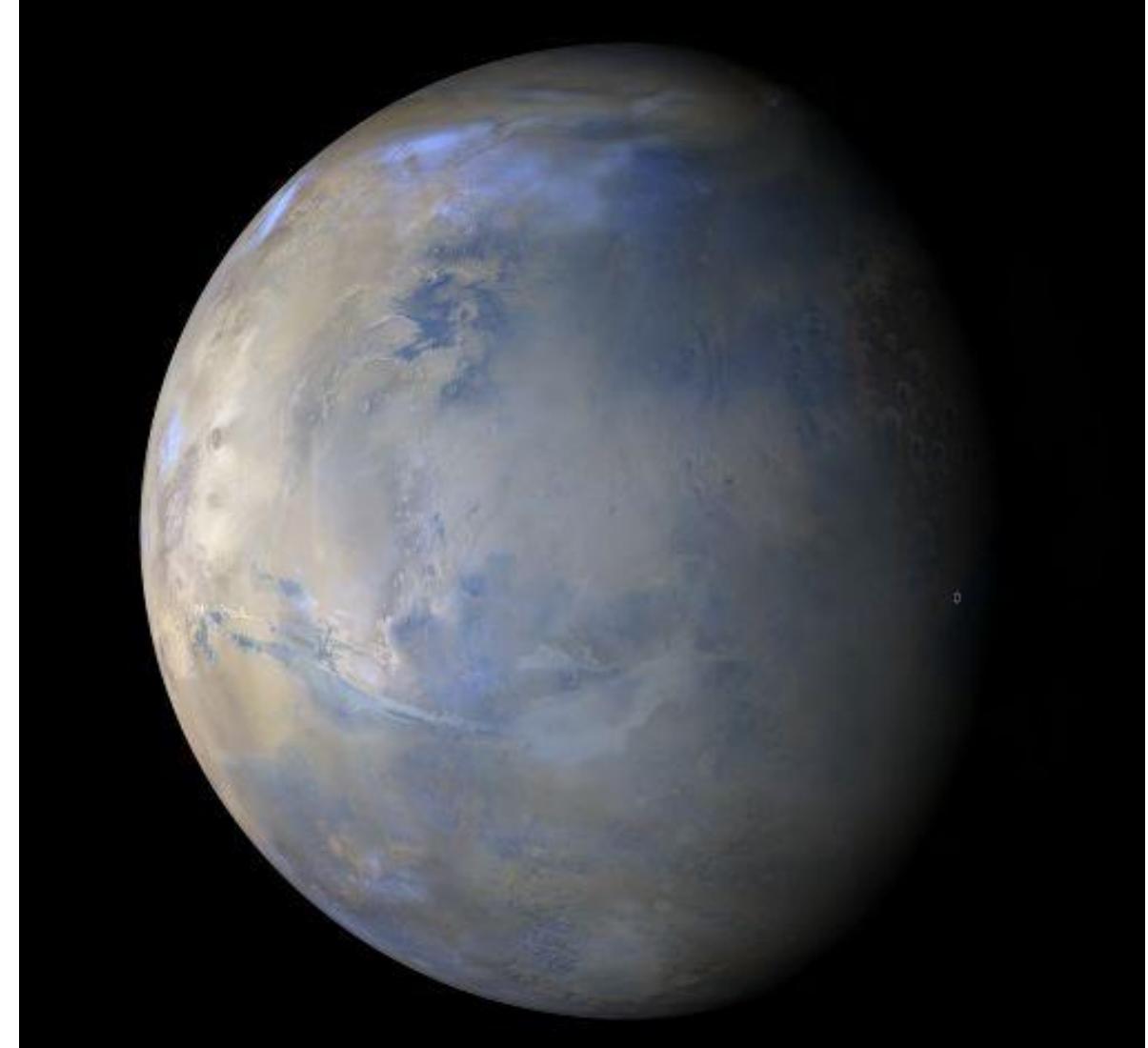
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Looking Ahead: Climate/Weather

- Working with Laura Kerber at JPL on integration of her mapped data products focusing on Mars climate
- Working with Jeff Hollingsworth at NASA Ames to determine ways of representing his weather models
- As we integrate time series capabilities, looking at integration of MARCI daily global images documenting Martian weather





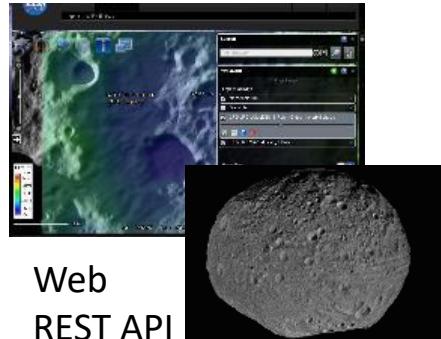
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User Experience



Virtual Reality Client



Touch Table



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Help us improve this portal!

Please let us know of any data products that you have and/or know about which would be of particular value to you to have included.



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Thank You!

<https://marstrek.jpl.nasa.gov>

<https://moontrek.jpl.nasa.gov>

<https://vestatrek.jpl.nasa.gov>

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